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Alan J. Ying
William T. Lawson
Matthew Cross
Travis Teague
INVENTORS

METHOD AND SYSTEM FOR EXTRACTING MEDICAL INFORMATION FOR PRESENTATION TO MEDICAL PROVIDERS ON MOBILE TERMINALS

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BACKGROUND OF THE INVENTION

5 **Software Code Appendix**

The present disclosure includes a compact disc appendix comprising exemplary code for the present invention. The contents of this disc are hereby incorporated by reference. Pursuant to 37 C.F.R. § 1.52(e) (Sept. 8, 2000) the names of the files, their date of creation, and their sizes in bytes are set forth below:

10 **List of Files (all created 1/24/01):**

ReadMeFirst, 2kb

Folder MCentral
15   MCentral ERD, 116kb (.gif file)
        MCentralStorage.sql, 1kb
        mmd_packages_constants.sql, 1kb
        mmd_packages_dictionary.sql, 2kb
        mmd_packages_med.sql, 3kb
20   mmd_packages_patient.sql, 4kb
        mmd_packages_patientupdate.sql, 3kb
        mmd_packages_result.sql, 8kb
        mmd_performance.sql, 1kb
        mmd_syn.sql, 9kb
25   mmd_tables_v1.0.sql, 32kb
        mmd_views_census.sql, 2kb
        mmd_views_labs.sql, 12kb
        mmd_views_meds.sql, 1kb
        mmd_views_patient.sql, 2kb
30   MMDEnableConstraints.sql, 4kb
        MMDTables.sql, 28kb
        UsersRolesPrivs.sql, 1kb

Folder MData
            Folder backups
                  Folder Rsc
                        Folder Resource.frk
5   screens.rsrc, 147kb (RSRC file)
                                    vssver.scc, 1kb (SCC file)
                        screens.rsrc, 0kb (RSRC file)
                        screens_res.h, 26kb (H file)
                        vssver.scc, 1kb (SCC file)
10   MData.prc, 112kb (Palm OS 3.5 application)
            Folder MData Data Model
                  Documentation.txt, 4kb
                  MMD_ABG_INFO, 1KB
                  MMD_CBC_INFO, 1KB
15   MMD_CENSUS_INFO, 1KB
                  MMD_CHANGE_INFO, 1KB
                  MMD_CHEM_INFO, 1KB
                  MMD_COAG_INFO, 1KB
                  MMD_FLUID_INFO, 1KB
20   MMD_GI_INFO, 1KB
                  MMD_HEART_INFO, 1KB
                  MMD_LIST_INFO, 1KB
                  MMD_LKP_ACTIONCODE_INFO, 1KB
                  MMD_LKP_BILLCODE_INFO, 1KB
25   MMD_LKP_DXCODE_INFO, 1KB
                  MMD_LKP_PROCCODE_INFO, 1KB
                  MMD_LYTES_INFO, 1KB
                  MMD_MEDS_INFO, 1KB
                  MMD_MICRO_INFO, 1KB
30   MMD_MISC_INFO, 1KB
                  MMD_PATH_INFO, 1KB
                  MMD_PREFS_INFO, 1KB
                  MMD_PT_INFO, 1KB
                  MMD_PTBILLCPT_INFO, 1KB
35   MMD_PTBILLEM_INFO, 1KB
                  MMD_PTDATA_INFO, 1KB
                  MMD_PTDX_INFO, 1KB
                  MMD_PTROUND_INFO, 1KB
                  MMD_RADS_INFO, 1KB
40   MMD_UA_INFO, 1KB
                  vssver.scc, 1kb (SCC file)
            Folder MData_Data
                  Folder MData
                        TargetDataWindows.tdt, 771kb (TDT file)
45   CWSettingsWindows.stg, 4kb (STG file)

Folder Obj
    MData.prc, 114kb (Palm OS 3.5 file)
    MData.prc.psym, 184kb (PSYM file)
    MData.tmp, 0kb (TMP file)
5   Folder Rsc
    Folder Resource.frk
      Screens.rsrc, 149kb (RSRC file)
      Vssver.scc, 1kb (SCC file)
    Screens.rsrc, 144kb (RSRC file)
10   Screens_res.h, 27kb (H file)
    Vssver.scc, 1kb (SCC file)
Folder Src
    MEM_LEAK.C, 3KB
    MEM_LEAK.H, 2KB
15   MmdBilling.c, 28kb
    MmdBilling.h, 1kb
    MmdCensus.c, 15kb
    MmdCensus.h, 2kb
    MmdDO.c, 3kb
20   MmdDO.h, 1kb
    MmdGlob.c, 5kb
    MmdGlob.h, 5kb
    MmdHotlist.c, 55kb
    MmdHotlist.h, 3kb
25   MmdMData.c, 5kb
    MmdMData.h, 2kb
    MmdMeds.c, 20kb
    MmdMeds.h, 2kb
    MmdPatient.c, 25kb
30   MmdPatient.h, 1kb
    MmdPHDA.c, 12kb
    MmdPHDA.h, 1kb
    MmdScribble.c, 14kb
    MmdScribble.h, 2kb
35   MmdSearch.c, 15kb
    MmdSearch.h, 3kb
    MmdTest1.c, 20kb
    MmdTest1.h, 1kb
    MmdTest3.c, 18kb
40   MmdTest3.h, 2kb
    MmdUtil.c, 38kb
    MmdUtil.h, 2kb
    MmdVitals.c, 11kb
    MmdVitals.h, 1kb
45   SonyChars.h, 1kb
    StuffForVs.c, 1kb

Updt.zip, 26kb (Winzip 8.0 file)
Vssver.scc, 1kb (SCC file)
mData Data Dictionary, 38kb (MSWord 2000 document)
Mdata.mcp, 41kb

5   Mdata.old.mcp, 41kb
mmdi.zip, 713kb (WinZip 8.0 Document)
Patent App.zip, 140kb (WinZip 8.0 Document)
vssver.scc, 1kb

10   Folder Minterface
MmdIE.cls, 24kb
MmdMC_Ora.cls, 33kb
MmdMed.cls, 4kb
MmdPatient.cls, 6kb

15   MmdResultGroup.cls, 3kb
MmdResultGroupTypes.cls, 3kb
MmdResultTypes.cls, 3kb

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25   **Field of the Invention**

The present invention relates to a technique for accessing medical databases and

delivering the content thereof to medical providers through a mobile terminal.

Description of the Related Art

Medical providers are notoriously resistant to change in their workplace. As a

30   result, they frequently do not accept new technology simply because it is new and may

not be better. Medical providers often only accept change when they have to or when it

truly does make their job demonstrably easier and/or faster.

Conversely, a common complaint among many medical providers is the lack of access to information needed to treat patients effectively. Medical providers are loath to travel to an inconveniently located desktop terminal or workstation only to spend several minutes logging into the system, accessing a database, and then slowly sifting through the

5   medical records that may be contained therein in an attempt to find a bit of desired information and then transcribing it or printing it out for later use.

Medical institutions, such as hospitals, may have a paper file with hard copies of the pertinent medical information, but again, this is cumbersome, antiquated, and not always orderly. As more hospitals move to electronic databases, even these portable,

10   albeit outmoded, records may be hard to come by. Thus, the two primary vehicles by which medical records may be accessed are inadequate to help medical providers access the medical records where they are needed the most - by the patients' bedsides.

Let it not be said that medical providers are completely hateful of new technology. Many medical providers have become addicted to handheld devices such as

15   the ubiquitous PALM PILOT® series of devices. Likewise, many doctors may supplement their PALMS or replace them entirely with wireless telephones and/or pagers. Such devices, collectively referred to as mobile terminals, are uniquely positioned to provide access to the medical records that the medical providers desire. However, a barrier remains in that the medical records are typically held in a proprietary

20   database isolated from wireless access and are not in a format that is conducive to presentation on a mobile terminal.

SUMMARY OF THE INVENTION

The present invention comprises a technique to enhance patient care by providing medical providers with accurate, up to date, easily accessible information about the patients in their care presented in an ergonomic and intuitive fashion. Initially, databases

5　of medical records, typically stored by a hospital, are accessed and the information contained therein is extracted and reformatted in a consistent manner. Software may be used to perform this extraction and reformatting. These medical records are then provided to the medical providers through a mobile terminal.

In one embodiment, the present invention provides the medical records to a

10　personal digital assistant such as a PALM PILOT®. The display of the personal digital assistant comprises a plurality of large, ergonomic buttons that may be used to transition between different screens of information in the medical records. Medical providers synchronize to the database at regular intervals to keep the records on the personal digital assistant current as well as to update the hospital database with information entered into

15　the personal digital assistant.

In a second embodiment, the present invention provides the medical records to a mobile phone device. The mobile phone may have buttons apart from the display by which the medical provider can again transition through different screens of information in the medical records. In this embodiment, the medical provider may download only

20　those records that he needs as he needs them. Likewise, updates are transmitted from the mobile phone back to the database. It should be appreciated that the hospital may have a Localized Wireless Telephone System or comparable system serving the hospital campus through which the mobile phone communicates with the database.

Another aspect of the present invention is the promotion and sales associated with this service. In particular, the present invention is well adapted to provide a residual revenue stream for a service provider who implements the service at a number of locations. Thus, the service provider may initially contact hospitals and other sources of

5   the typically proprietary databases and secure permission to access and reformat the database for use with the other aspects of the present invention. This may involve a fee being paid by the service provider to the database proprietor, or better, a fee paid by the proprietor to the service provider. The service provider may further give away a number of mobile terminals to select medical providers so as to generate interest in the service. A

10   monthly service fee may be charged to the medical providers, much like mobile phone users pay a monthly service fee for telephone service. Further mobile terminals may be sold by the service provider or a third party as needed. Likewise, it may be possible for the service provider to partner with a mobile network provider such as Ericsson to help install Localized Wireless Telephone Systems in hospitals and the like so that the present

15   invention may be practiced more easily in hospital environments.

Still other aspects of the present invention involve charge capture services, hospital census services, and the like, all of which may be integrated into the same interface provided to the medical providers.

20   **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 illustrates a flow chart describing accessing databases for creation of the modified medical records of the present invention;

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Figure 2 illustrates a front plan view of a personal digital assistant with a medical record displayed thereon;

Figure 3 illustrates a schematic diagram of a hospital with multiple docking stations for synchronization of the personal digital assistants of the present invention;

Figure 4 illustrates a front plan view of a mobile phone with a medical record displayed thereon;

Figure 5 illustrates a Localized Wireless Telephone System for use with the mobile phones of the present invention;

Figure 6 illustrates a schematic overview of the database organization such as may be used in one embodiment of the present invention;

Figure 7 illustrates an exemplary schematic chart of possible button links used with the medical records of the present invention;

Figure 8 illustrates a flow chart of the steps by which the present invention may be promoted to medical providers;

Figure 9 illustrates a flow chart of an exemplary use session of the medical records of the present invention by a medical provider using a personal digital assistant; and

Figure 10 illustrates a flow chart of an exemplary use session of the medical records of the present invention by a medical provider using a phone device.

DETAILED DESCRIPTION OF THE INVENTION

The present invention comprises providing medical providers with medical records in a mobile terminal so that the medical providers may access the medical records

without being tied to a desktop workstation. An individual or a company, both herein referred to as a service provider, may be the moving force behind these activities. It is expected that the service provider will be a profit oriented business who also desires to see the quality of care to patients improve by the provision of the medical records to the

5   medical providers.

Initially, the service provider will have to acquire the medical records in a format that is amendable to presentation on the mobile terminals. A flow chart of this initial process is illustrated in Figure 1. The service provider, or a representative of the service provider, may contact the managers of the databases containing the medical records

10   (block 10). It is expected that these managers may be hospitals or companies to whom hospitals have outsourced the medical record maintenance responsibilities. E.g., Cerner and Shared Medical System. In some cases, these companies merely sell software to the hospitals depending on the preference of the hospital, in which case, the manager of the database may be a hospital employee. Additionally, it is possible that medical providers

15   who are not associated with a hospital (e.g., a practice group, a partnership, a solo practitioner, or the like) may have medical records amenable to incorporation and use in the present invention. Thus, the service provider may also contact such individuals or groups and the present invention is not restricted to hospitals per se.

After the appropriate sales presentation, the database manager may pay a fee to

20   the service provider. Alternatively, the service provider may pay a fee to the database manager. Regardless of the nature of the transaction, the service provider secures access to the database (block 12).

In one embodiment, the files are copied to a computer memory local to the service

provider (block 14), leaving the original database unmodified. The medical records are

analyzed for the structure thereof (block 16). Specifically, it is desired to learn what

fields of the database contain what information. The service provider may then write a

5   software program that extracts the information from the copied files (block 18) and

inserts it into a new database in the format desired (block 20). The new database is then

saved (block 22). This is a rather brute force approach, but is certainly possible.

In another embodiment, where the medical records only exist in a paper format,

the service provider may hire data entry personnel to read the medical records and enter

10   the desired information into the new database. This is, as would be expected, inefficient

and very labor intensive, but having been done once for that particular collection of

medical records may not need to be done ever again. For example, it may be appropriate

when a wholesale conversion from a paper office to an electronic office is contemplated.

In yet another embodiment, the original database may communicate with the new

15   database through standard Open DataBase Connectivity (ODBC) drivers. The service

provider may then simply query the original database and derive the desired information.

In still another embodiment, the original database may be HL7 certified. HL7

stands for Health Level 7 and is a standard presently in its third version. Details may be

found at www.hl7.org. In essence, this standard allows data to be passed between

20   providers and used as desired. Either of the last two cases greatly simplifies the

extraction and translation of the data from the original database to the new database

created by the service provider.

The purpose of the extraction and reformatting is to present the data of the medical records in a format that is acceptable for display on a mobile terminal. To facilitate an explanation of the methodology of the present invention, what follows is a discussion of the hardware. It should be appreciated that the term mobile terminal may

5　　include a cellular radiotelephone with or without a multi-line display; a Personal Communications System (PCS) terminal that may combine a cellular radiotelephone with data processing, facsimile and data communications capabilities; a PDA that can include a radiotelephone, pager, Internet/intranet access, Web browser, organizer, and/or calendar; and a conventional laptop and/or palmtop receiver or other appliance that

10　　includes a radiotelephone transceiver. Mobile terminals may also be referred to as "pervasive computing" devices. However, the present application will focus on two such devices, namely personal digital assistants (mobile terminal 50) such as that illustrated in Figure 2 and mobile phones (mobile terminal 100) such as that illustrated in Figure 4. Mobile terminal 50 may be a PALM PILOT® or the like and may comprise a display 52

15　　and a plurality of buttons 54 as is conventional. Display 52 may include a data field 56 comprising a patient's name field 58, a movement icon 60 and a plurality of special icons 62. As is conventional on most personal digital assistants, display 52 may comprise some form of touch screen, accepting inputs by touching the display 52. Display 52 may further comprise a data entry field 64 used in conjunction with a stylus (not shown) as is

20　　conventional. In one embodiment, the display 52 comprises a color display with the icons and information displayed thereon colored to provide easy reading for the viewer. Movement icon 60 may change the information and icons displayed, in effect acting like a scroll bar. Movement icon 60 and special icons 62 are sized so as to be actuatable by a

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finger rather than a stylus and include imagery that is a convenient shorthand representing medical information. Special icons 62 are explained in greater detail below with reference to Figure 6.

Personal digital assistants, such as mobile terminal 50 may not be equipped with long range transceivers and may require docking stations through which they receive access to the database in which the properly formatted medical records are contained. This situation is illustrated schematically in Figure 3. In particular, a central server 70 may be positioned anywhere within the hospital 72. Central server 70 may comprise a single processor, a plurality of CPUs, or the like as needed or desired and have memory associated therewith on which the reformatted database is stored. In one embodiment, the central server 70 may be an ORACLE based server. Other servers may also be appropriate and the particular server is not material to the present invention.

Hospital 72 may include a plurality of wards or divisions 74 each with a docking station 76 communicatively connected to the central server 70. In one embodiment, the connection is provided by EXTENDED SYSTEMS' XTNDCONNECT SERVER. In practice, medical providers will periodically bring the mobile terminal 50 to one of the docking stations 76 and synchronize with the information stored on the central server 70. Docking stations 76 may require a physical connection, but are more favorably infrared transmission based, allowing synchronization of five to eight mobile terminals 50 simultaneously. An acceptable device to do this the CLARINET SYSTEMS EthIR LAN that transforms standard existing Ethernet connections to wireless access points. The EthIR Beam module supports Windows CE™, PALM™, EPOC, and LINUX devices,

and is capable of 4 Mbps throughput while complying with all the appropriate IEEE, FCC and IrDA standards.

It should be appreciated that the synchronization is designed to be two-way. For example, in the morning, a medical provider docks his mobile terminal 50 in a docking

5   station 76 and downloads information into the memory of the mobile terminal 50 related to his access privileges. As the medical provider performs his rounds, he or she enters data into the mobile terminal 50 relating to treatment regimens and the like. Upon completion of the rounds, the medical provider docks again, uploading the information entered into the mobile terminal 50 into the database for sharing with other medical

10   providers. Note that this upload may update the information not only in the central server 70, but also in the original hospital database if it is stored in a different memory device, such as the original hospital server. This process of downloading and uploading, or synchronizing is well understood in the art.

Note that hospital 72 is used as an example, and is not intended to be limiting.

15   Smaller facilities may not need more than one docking station 74 per building. Variations on this are well within the skill of those in the art.

An alternate embodiment may incorporate radio frequency (RF) wireless technology wireless protocols. An exemplary mobile terminal 100 is illustrated in Figure 4. Mobile terminal 100 may comprise a keypad 102 having numerical keys 104,

20   directional keys 106 and a select key 108; a display 110; and an antenna 112 as is well understood in the wireless communication industry. Mobile terminal 100 may be manufactured by any one of a number of different manufacturers such as ERICSSON, NOKIA, MOTOROLA, or the like. Mobile terminal 100 may conform to such standards

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as TIA/EIA-136, IS-95, CDMA, AMPS, D-AMPS, BLUETOOTH or the like. The standards are well documented and a further discussion is omitted. Note further, the mobile terminal 100 may also be a wireless enabled personal digital assistant that is Bluetooth enabled, uses 802.11 standards or the like. These sorts of devices avoid the

5   need for synchronization.

Display 110 may comprise an information section 114 and an icon section 116. Information section 114 may display information from the medical record in a format that is easy to read, adapted for the size of the display 110, and corresponding to one of the icons 118 in icon section 116. Directional keys 106 and select key 108 may be used to

10   highlight and select different icons 118 to move between different pages of information being displayed in information section 114. In effect, the icons 118 become a menu and the keys 106, 108 allow the menu to be browsed and a desired element of the menu selected.

Mobile terminal 100 may be equipped with a transceiver enabling two-way

15   communication such as is well understood in the art and as explained in the above mentioned standards. To that end, it is expected that the hospital 72 will have some sort of local, private wireless system in place to facilitate communication between a central server 152 hosting the reformatted database and the mobile terminals 100 in the possession of the medical providers. One such local wireless system is illustrated in

20   Figure 5. Hospital 72 may be equipped with a Control Radio Interface (CRI) 150 that is communicatively coupled to a server 152 that houses the reformatted database of the present invention, a plurality of radio heads 154, and an Mobile Switching Center (MSC) 160 within the Public Land Mobile Network (PLMN) 162. The PLMN 162 may

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comprise a plurality of base stations 164 as is well understood and be connected to the Public Switched Telephone Network (PSTN) 166. Suitable local wireless systems include the MOBILE ADVANTAGE™ Wireless Office sold by Ericsson, or the RBS 884 PICO SYSTEM, also sold by Ericsson. Other networks are also possible. Mobile terminals 100 may move around within the local system just like they move about in a normal cellular system. Note further that the local wireless system need not be connected to the PLMN 162 if so desired. For example, for security reasons, it may be desirable not to allow access to the PLMN 162 and the PSTN 166.

In addition to making normal phone calls, receiving pages, short message services and the like, the mobile terminals 100 may also selectively access the server 152 and secure therefrom a medical record formatted according to the present invention. It should be appreciated that appropriate encryption technology may be used so as to preserve the privacy of the medical information. The medical record is then displayed on the display 110 of the mobile terminal 100. In particular, mobile terminal 100 communicates via antenna 112 to a nearby radio head 154 and accesses server 152 through the CRI 150. The server 152 obligingly provides the requested information, which in turn is transmitted from the radio head 154 to the mobile terminal 100 for display. Any updates entered by the medical provider are forwarded upon entry by the medical provider to the server 152.

Note that servers 70, 152 may communicate with the computer containing the original, unaltered database of medical records, providing updates thereto as needed or desired. Thus, these computers may be networked through a conventional approach, selectively connected over a modem or the like as needed or desired.

As another embodiment, one in which the hospital database is used more directly, the hospital database is connected to a translator server such as an HL7 parser which in turn puts the information from the hospital database into a staging database, perhaps on the same server. The docking stations 76 or radio heads 154 then communicate with the

5   staging database as previously described. This embodiment allows the medical providers to have access to the information in the hospital database in a more dynamic, real-time manner. This is as opposed to a one time data dump from the hospital database.

Conceptually, one embodiment of the database situation is presented in Figure 6 noted generally at 175. Hospital databases 176 may be interconnected. An interface 178,

10   such as any of those described above extracts the information from the hospital databases 176 and provides it to a proprietary central intermediate database 180 (this corresponds to 70 and 152). Again, this may be an ORACLE database. Enterprise conduit software 182, such as the aforementioned EXTENDED SYSTEMS' XTNDCONNECT SERVER, may be used to transport information from the central database 180 to the docking

15   stations 76 or the radio heads 154, from which it is provided to the mobile terminals 50, 100.

Icons 118 are illustrated in tabular form in Figure 7. Scroll icons or buttons 200 act to move medical providers between different menus or allow different icons 118 to be displayed in icon section 116. These icons may be used in place of the need for buttons

20   on the mobile terminal 50 or 100.

Other possible icons include thermometer icon 202 that shifts the medical provider to an information screen containing information relating to the patient's vital statistics. This may be a free form data entry field to record daily events. Further, it is

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contemplated that the previous day's text is reproduced automatically for the next day with some indicia (such as an asterisk) that the text is reproduced. Thus, the medical provider does not have to re-enter duplicative data every day. Of course if a change is entered, this new data is displayed where appropriate.

5   Prescription icon 204 shifts the medical provider to an information screen containing information relating to the current medications that the patient is receiving. It may be linked to software that checks for harmful drug interactions or the like.

Other labs icon 206 shifts the medical provider to an information screen containing information relating to lab tests that may have been run for the patient. This

10   may be presented as a pop up list that lists lab results that can then be viewed by selecting from the list. These lab tests may not be the most common sorts of tests, but are used with sufficient regularity to be included. The text of the pop up list is specifically made large enough so that the medical provider can select from the list with their finger rather than having to use a stylus.

15   Hotlist icon 208 shifts the medical provider to a customizable information screen. Medical providers can indicate which lab tests they desire to see most frequently. This may be related to their specialty area for example. Thus, when this button is tapped, the medical provider is taken to the tests that provide him with the most information. For example, a cardiologist may want to know the results for three certain tests, whereas an

20   intestinal doctor may want to know the results of a different set of four tests. This icon allows the medical provider to program the mobile terminal 50 or 100 to show these desired test results.

CBC icon 210 shifts the medical provider to an information screen containing information relating to test results from a very common set of tests known as CBC.

Chem7 icon 212 shifts the medical provider to an information screen containing information related to test results from a very common set of tests known as Chem7.

5   Bug icon 214 shifts the medical provider to an information screen containing information related to microbiology cultures. Thus, results from cultures sent on the person are available. E.g., blood infection grew from E. Coli.

Allergies icon 216 shifts the medical provider to an information screen containing information related to allergies for that particular patient. It may be linked to the

10   information in the prescription screen to check for allergic reactions to proposed medication regimens.

Other data fields include HD - the hospital day, derived from the date of admission on the hospital record; PD - post operative day; DX - diagnosis; OR - operative procedure the patient underwent; and HX - history. It is contemplated that the

15   PD button will cause a calendar to pop up and the medical provider may indicate the day on which an operation occurred. The DX field will allow the entry of free form text so that the medical provider may indicate in their own words the patient's relevant diagnoses. Likewise, the OR field will allow the entry of free form text so that the medical provider may indicate the nature of the surgery and any other relevant details.

20   Similarly, the HX field allows the entry of free form text about the history of the patient.

Not all of this information needs to be stored in the hospital database with the unaltered medical records. Rather, it may be stored simply in the central servers, 70, 152 and accessed by the medical providers as needed or desired. This may comprise an

economically important function that allows the database to be mined for critical data that is only accessible to the end user.

The important thing about the icons is their ability to be seen easily and manipulated easily. They are preferably large enough and ergonomically designed so as to allow actuation without the need for a stylus, but rather may be actuated with a thumb or other finger. They are preferably multicolored and intuitive so that medical providers may at a glance know which icons will take them to what information. The exact placement of the icons on a display is not critical, and may be customized to the medical provider so that the icons most commonly used appear on the main screens in a desired location.

Still other commands/icons may be incorporated into the displays 52, 110. A PRINT command enables the medical provider to use infrared beaming of the patient information to an IrDA compatible printer or other comparable device.

A "Hotlist/Patient" command allows the medical provider to indicate on the preferred first screen after selecting a patient's name from a list of patients. This button is exemplary of the ergonomic innovation of the present invention in that it speeds work flow by allowing quicker access to the more relevant information that the medical providers need. This may be, for example, the hotlist test results, or a general default patient information screen having HD, PD, and OR information. Other screens are also possible as needed or desired.

A NOTE command takes the user to a totally freehand blank screen that allows the medical provider to draw notes, pictures, or the like as needed. This command in particular may be preserved in a particular position on the display 52, 110 in every

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screen, such as the lower right hand corner. Notes may be erased with an ERASER button on the scribble screen. Further, the contents of this screen will be linked to the patient file such that if a medical provider scribbles some notes about a patient, then switches through multiple other screens and/or patient information, upon returning to the note button for the original patient, the notes are still available for the medical provider to view. This may be done with memory in the mobile terminal 50, 100 or in the server that stores the medical records.

A DETAILS command allows the medical provider to secure more details about a particular lab or test result. In particular, it is expected that many lab or test results will be abbreviated with the most commonly desired information presented first. Additional details will be available through the use of this command. Access to the additional details will be achieved by touching the result set of interest on the screen.

An ADD PATIENT command may be displayed as a "+" sign or the like, and allows the medical provider to enter a patient's medical record number or other unique patient identifier manually, and at the next synchronization, the patient's complete medical record will be loaded into the memory of the mobile terminal 50, 100. In the situation where the mobile terminal is a mobile type device, this command will activate a call to the central server 152 and download the information. This feature allows medical providers to acquire access to the medical records of patients that were erroneously omitted from a synchronization or added to the ward after a synchronization visit.

Other features are also possible. For example, as an alternate revenue generator, the service provider could sell advertising on a "Product of the Day" icon. This icon may likewise be ergonomically designed so that it complements the rest of the icons and is

used because it is easy and intuitive. This might be located in an unobtrusive portion of the display 110 so as to avoid inadvertent triggering. Medical providers may peruse this feature in down time, such as when waiting on an elevator, eating a meal, or the like. This may eliminate needless interruptions by sales representatives or the like. Further, in one embodiment of the present invention, when medical providers subscribe to the present service, they would identify their specialty areas and qualifications. This may be done to differentiate between medical students and attending physicians, nurses, and the like. With the identification of the specialty areas, the advertising may be targeted specifically to the desired audience. For example, cholesterol drugs could be advertised to cardio-thoracic surgeons while VIAGRA™ was advertised to a geriatric specialist. In effect, this allows marksman marketing as opposed to shotgun marketing such as billboards, pamphlets, brochures, and the like. It helps ensure that the information reaches exactly the desired target audience.

As a security measure, if the mobile terminal 50, 100 is not used for an amount of time greater than a predetermined threshold, the medical provider may have to log in to the device. This may be done through any well understood user name and password type log in activity. Further, if the mobile terminal 50, 100 is not used for an amount of time greater than a second predetermined threshold, the entire memory of the mobile terminal 50, 100 may be purged of all medical records. This helps insure that access to the confidential medical information is not given to an unauthorized user.

As yet another concern, the Health Insurance Portability Account Act (HIPAA) of 1997 has laid out several federal rules about electronic data transfer as it relates to

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medical records. Individuals or companies who practice the present invention need to be aware of the contemporaneous interpretation of this statute to comply therewith.

Against this backdrop of hardware and software, the methodology of promoting the service is presented with reference to Figure 8. Initially, the service provider

5   establishes the database with the information formatted in the appropriate manner (block 200). This process was described with reference to Figure 1. The service provider may distribute for free mobile terminals 50, 100 (either personal digital assistants, mobile phones, or other appropriate device) to a select number of medical providers, for example, the first 1,000 medical providers (block 202). At the same time, the service

10   provider could require service contract commitments from the medical providers that have just received a new mobile terminal 50, 100 (block 204). The service contract allows access to the reformatted database and any other services that the service provider provides and entails a monthly fee. Note further that the service provider may charge a monthly fee to the hospital or other entity for maintenance of the database and inclusion

15   of new medical records. Thus, the service provider has residual revenue streams that help finance future expansions.

As part of the service contract process, the service provider may solicit information from the medical provider relating to areas of specialty and nature of their authority (block 206). For example, physicians may have different access privileges than

20   nurses or medical students. Likewise, surgeons may need different information than a family physician who has no surgery privileges at a hospital. Other levels of access may be defined as needed.

After the initial promotional give away, the service provider may sell branded

mobile terminals 50, 100 to medical providers with or without service contracts (block

208). Obviously, the service is only provided to the medical providers who subscribe to

the service, but some may just desire a mobile terminal 50, 100. Discounts may be

5   provided on the purchase price of the mobile terminals 50, 100 for those medical

providers who sign long term contracts.

As an added advertising ploy, the service provider may provide mobile terminals

50, 100 and the service for free to medical students (block 210) in teaching hospitals.

This exposes the medical students to the concept and utility of the service, fostering

10   brand loyalty and occupying part of the mental desktop of the students. Then, upon

graduation, the mobile terminals 50, 100 are turned in to the service provider, and the

student embarks on his career. Already accustomed to the service, the new physician

may demand that the hospital at which they now work invest in the service as an

invaluable tool. This has worked extremely well in indoctrinating law students in the use

15   of WESTLAW and LEXIS, resulting in a steady stream of revenue for both services.

Alternatively, instead of providing the service for free, reduced rates may be provided to

medical students. As yet another alternative, teachers may be encouraged to use the

service during rounds with their medical students so that copies of medical records are

available to all of the students simultaneously without the need for multiple paper copies.

20   Once a few hospitals, especially teaching hospitals begin using the service, the

service provider may begin exploiting word of mouth advertising (block 212). Medical

providers are generally a gregarious group, attending conferences, continuing education

classes, and trade shows. Such arenas provide ample opportunity for those familiar with

the service to extol its virtues to those who have not yet subscribed. These newly informed individuals may return to their establishments and demand the service. Thus, the pool of subscribers expands.

Finally, the service provider may, after reaching a critical mass of subscribers, begin embarking on strategic expansions of service areas and services provided (block 214). For example, more hospitals may be converted; small practice groups may be converted; and so on until substantially all the medical providers are using mobile terminals 50, 100 to access their medical records in an ergonomic easy to access manner. Further, in addition to just medical records, the service provider could adapt the service to include charge capture services, prescription writing services, content provision, and the like. Content provision may be Internet access along the lines of an AOL model, periodical article access, news releases about new drugs, and the like as needed or desired. These additional services may be add-ons to the basic service package, resulting in additional revenue for the service provider, or packaged together as needed or desired.

Three such packages merit further exploration as being particularly contemplated for use with the present invention. These add on features may be sold independently of the provision of medical records service, but it is contemplated that these services will be designed with similar ergonomic buttons that integrate easily into the medical record service. Medical providers using the medical record service will have at their fingertips these additional services and use them as an outgrowth of the core medical record service.

The first add-on service would be a hospital census service. Hospitals presently have a large burden in estimating patient flow through the hospital for allocating bed spaces, alerting admitting physicians as to how many beds are available for admissions and the like. This service would periodically inquire of the medical provider authorized to make a discharge of a patient when the medical provider expects to discharge the patient. Thus, the medical provider may indicate on the day after surgery that the patient is expected to stay for one week, but on the third day may indicate that the patient is healing better than expected and will be discharged the following day. This alerts the hospital to the opening of a bed space for planning purposes. The information may be stored in the same database as the medical records or separately as needed or desired. The inquiry may be through a pop up screen as when the medical provider closes a particular medical record, as an additional icon, or other technique as needed or desired.

The second add-on feature that is specifically contemplated is a feature that allows charge capture services to be implemented in conjunction with the use of the medical record. Presently, hospitals have to determine inferentially whether a service that justifies a charge has been performed. This is due in large part to the hurried nature under which many of these services are performed and the fact that the medical provider performing the service may not remember at a later time to enter the appropriate information. Thus, the service provider may include a charge capture icon or the like that inquires of the medical provider what services have been provided to a particular patient at a time relatively close to the provision of the services so as to increase the likelihood that the medical provider remembers exactly what services have been provided and thus

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may be billed. As an alternative to an icon, this inquiry may be in the form of a pop up window when the medical provider closes a particular record.

The third add-on feature comprises a reference interface. Selection of an appropriate icon would take the medical provider to reference material relevant to the

5   subject about which they are concerned at the moment. These reference materials may be textbooks, the PDR, periodicals or the like. In general, periodicals may be a bit too dynamic for a synchronizing mobile terminal 50, but may be accessible by a wireless mobile terminal 100. The reference icon may take the medical provider to a dedicated search engine that only searches medical references for the desired information.

10   Alternatively, actuating the reference icon may force the controller of the mobile terminal 50, 100 to evaluate the last command given prior to actuating the reference icon and inferentially determine what sort of resource is desired. For example, if a particular one of the Chem7 tests was being viewed in detail, and the medical provider then actuates the reference icon, the medical provider may then be provided information relevant to that

15   test and potential diagnosis. The reference source may be provided in a HTML or WML format so that if, for example, the test states that results of X are indicative of a certain disease, the medical provider may immediately be linked to information about that disease. Other formats are also contemplated.

Exemplary methods of using the present invention by medical providers are

20   presented in Figures 9 and 10 as flow charts. These are exemplary and not intended to be limiting, but are provided to illustrate how the present invention may be used by a medical provider to make his life easier. Figure 9 assumes that the medical provider has a personal digital assistant type mobile terminal 50. In particular, the medical provider is

assumed to be a physician, although as noted above, the medical provider could in fact be a physician extender or the like such as a PA, RN, case manager, medical student or the like. The physician initially secures a mobile terminal 50 and a service contract (block 300). This may be the result of an advertising promotion, word of mouth advertising, or

5 other reason. At some later point, the physician has begun using the personal digital assistant as a calendar and the like. The physician wakes up (block 302) and as part of his morning ritual, checks his calendar on the mobile terminal 50 (block 304) to see the day's appointments. Note that this calendar software is conventional on most personal digital assistants and is not necessarily incorporated into the software of the present

10 invention. Both applications reside concurrently in memory on the mobile terminal 50. This may be in the midst of breakfast, between shaving and showering, or whenever is convenient.

The physician then goes to the hospital (block 306). One of the first things that the physician does is to dock his mobile terminal 50 at a docking station 76 to download

15 all the needed medical records to the mobile terminal 50 (block 308). Note that the physician may only get medical records for his patients, the patients on the ward in which the physician works, or some other subset of all available medical records. This preserves memory in the mobile terminal 50 if desired. Some physicians may restrict access to their patients' medical records for some reason. In such a case, these may not

20 be provided to another doctor. Of course, it is possible that every medical provider gets every medical record if so desired on the part of the service provider.

Armed with the medical records in the mobile terminal 50, the physician does his morning rounds. As part of these rounds, the physician accesses the medical records from the bedside (block 310). This allows the physician to observe the patient while reflecting on the information in the medical records. To that end, the physician may use their thumb to scroll between different screens of information in the medical record (block 312). Appropriate use of the special icons 62 and the scroll icons 60 facilitates this information access. A stylus or other data entry means may be used by the physician to enter new information into the medical record if desired.

The physician completes his rounds and has lunch. During lunch, the physician reads an ad for a new drug related to treating hemophilia (block 314). As one of the patients in an upcoming procedure is a hemophiliac, he makes a note to order some, or at least investigate further.

Before beginning his afternoon rounds, the physician docks his mobile terminal 50 again at a docking station 76 (block 316). This is done while conferring with a nurse as to the status of a particular patient about whom the physician was concerned. This docking uploads any information entered by the physician to the central server 70, while downloading any other information that has been entered since the morning docking.

After completion of the rounds, and a final docking session (not shown explicitly), the physician checks the calendar for the next day's appointments (block 318) and sets his alarm clock accordingly (block 320).

The methodology of the mobile terminal 50 is not too dissimilar from that of the methodology of the mobile terminal 100. The primary difference is the absence of the need to dock the mobile terminal. Reference is made to Figure 10 for the methodology

associated with using the mobile terminal 100. The initial part of the process is identical

to that described above, namely blocks 300-306. The physician begins his rounds (block

350). Upon needing the medical record of a patient, the physician places a phone call to

the server 152 (block 352). The physician then accesses the desired medical record

5   (block 354). This phone call may be encrypted as desired to protect the privacy of the

individual whose medical record is then transmitted to the mobile terminal 100 through

the local, wireless telephone system. The physician uses the ergonomic buttons on the

mobile terminal 100 to scroll through and select the desired screens of information (block

356).

10   If the physician enters new information into the medical record, the mobile

terminal 100 sends the update to the central server 152 (block 358) by transmitting to a

nearby radio head 154 and communicating therethrough with the central server 152.

Upon completion of the physician's rounds, the physician may terminate the phone call

(block 360). Again the physician may check ads during lunch (block 314). The

15   afternoon rounds proceed substantially as the morning rounds did, with the physician

placing calls to the server 152 as needed to access additional medical records (block 362).

The physician's day ending routine is likewise similar (blocks 318 and 320).

        While the events in the flow charts of Figures 9 and 10 are illustrated linearly, it

should be readily apparent that the actual order of many of the events may take place as

20   needed or desired. Life in general is nonlinear and disruptions in routine may certainly

occur. Medical providers may dock more often than indicated if desired, or less

frequently if desired. Further, updates may have to be entered through other means rather

than through the mobile terminals 50 and 100. The flow charts are to illustrate exemplary embodiments.

The present invention may, of course, be carried out in other specific ways than those herein set forth without departing from the scope and the essential characteristics of

5   the invention. The present embodiments are therefore to be construed in all aspects as illustrative and not restrictive and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.